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PATENT
Docket No.: P1D1C1-US

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Michelle White

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Igor Y. Khandros

Application No.: 09/245,499

Filing Date: February 5, 1999

For: AN ELECTRONIC ASSEMBLY HAVING A SUBSTRATE WITH A PLURALITY OF TERMINALS, AND A PLURALITY OF ELONGATE SPRINGABLE INTERCONNECTION ELEMENTS CONNECT TO THE TERMINALS

Examiner: K. Cuneo

Group Art Unit: 2841

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PRELIMINARY AMENDMENT

Box: CPA
Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Prior to the calculation of fees and examination of this application, Applicant respectfully requests that the Examiner enter the following amendment.

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IN THE CLAIMS:

Please cancel without prejudice claims 39-112. Please add the following new claims 113-123:

113. (New) An electronic assembly comprising:

a semiconductor die having a plurality of terminals; and

a plurality of resilient, springable, free-standing interconnection elements, each of the interconnection elements having a die end attached directly to a respective one of the terminals on the die, an elongate section between the die end and a contact end, and a tip on the contact end, the tip pointing away from the die.

114. (New) The electronic assembly of claim 113 wherein the interconnection elements include a precursor element and an overcoat material covering said precursor element.

115. (New) The electronic assembly of claim 114 wherein the precursor element is of a flexible, substantially non-resilient material and the overcoat material provides the resilient springability of the interconnection element.

116. (New) The electronic assembly of claim 115 wherein the precursor element includes a material selected from the group of gold, aluminum and copper, and the overcoat material includes material selected from the group of nickel, cobalt and iron.

117. (New) The electronic assembly of claim 113 wherein the elongate section includes at least one bend

118. (New) The electronic assembly of claim 117 wherein the elongate section includes a proximate portion extending from said die end at an angle away from the die, a mid-portion extending at an angle from said proximate portion, and a distal portion extending at an angle from said mid-portion and away from the die.

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119. (New) The electronic assembly of claim 118 wherein the proximate portion extends from the die end at an angle substantially perpendicular to the die.

120. (New) The electronic assembly of claim 113 wherein the tip has a contact region which provides a releasable point contact.

121. (New) The electronic assembly of claim 120 wherein the contact end is moveable toward the surface of the die upon the application of a downward pressure upon the tip.

122. (New) The electronic assembly of claim 113 wherein the assembly further comprises a substrate having a plurality of contacts, and at least one of the interconnection elements conducts electricity when the tip of the interconnection elements is in releasable contact with a respective contact on the substrate.

Cont D1

123. (New) An electronic assembly comprising:

a semiconductor die having a plurality of terminals; and

a plurality of resilient, springable, free-standing interconnection elements, each of the interconnection elements including a precursor element of a flexible, non-resilient material and an overcoat material covering said precursor element, the overcoat material providing the resilient springability of the interconnection element, and having

a die end attached directly to a respective one of the terminals on the die,

an elongate section extending from the die end to a contact end, the elongate section including at least a first bend and a second bend, and

a tip on the contact end, the tip pointing away from the die.

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REMARKS

Applicant acknowledges with appreciation the Examiner's availability for a personal interview on September 12, 2000. The Interview Summary (Paper No. 16) accurately reflects the substance of the interview.

New claims 113 – 123 are pending in this case. Although this paper is a Preliminary Amendment, Applicant notes that a Final Action was mailed in the parent case on July 18, 2000. For purposes of completeness, this Preliminary Amendment addresses those of the various rejections and objections contained in the Final Action, which are believed to be relevant in view of the new claims.

THE DRAWINGS

Applicant will submit under separate cover drawings showing proper cross hatching consistent with MPEP 608.02. Formal drawings will be subsequently submitted upon receipt of an indication of allowance.

The Examiner has reminded Applicant that figures showing that which is old should be labeled with a prior art legend. The reference to Figure 1 is noted; Figures 1a and 1b include schematic representations of a known ball-and-wedge technique to form a loop-like wire skeleton of a protruding electrical contact. Applicant notes, however, that to the extent Figure 1 can be deemed to encompass the formation of an electrical contact directly on the semiconductor die, this is not old or prior art. Illustrative is the discussion at page 36 of the specification explaining that "[t]he contacts can also be put on top of terminals directly on semiconductor devices, such as silicon and gallium arsenide devices, for subsequent demountable or permanent attachment to interconnection substrates.") Accordingly, it is

believed that the prior art label should not be required in the present context and withdrawal of this rejection is respectfully requested.

Applicant believes the new claims present no new matter. In this regard, Applicant respectfully directs the Examiner to the following exemplary depictions of the claimed invention in the drawings and the accompanying explanation in the detailed description of the specification: Figure 8 (depicting an elongate element attached directly to the semiconductor die and having a tip pointing away from the die (e.g., independent claim 113)); and Figures 15 and 16 (depicting an elongate element directly attached to the semiconductor die and including a precursor and overcoat material (e.g., claims 114-116, independent claim 123), depicting the claimed bend and/or angles of the elongate section (e.g., claims 117-119), and the accompanying text discussing the tip contact (e.g., claims 120-133)).

The Treatment of Claims Based on Language and Format

Applicant notes the Examiner's rejection of numerous of then-pending claims 39, 41-112 under 35 U.S.C. § 112, second paragraph. Claims 113-123 were drafted mindful of the § 112 rejections and the Examiner's comments regarding suggested claim language.

Treatment of Claims Based On Prior Art

While the rejected claims have been cancelled, a brief explanation of the distinctions between the references cited in the Final Action and the new claims is provided.

As a starting point, it is emphasized that the claimed invention is directed to, inter alia, the attachment of an interconnection element directly to a semiconductor die. Each of new independent claims 113 and 123 includes the limitation of a "semiconductor die having a plurality of terminals" and "die end attached directly to a respective one of the terminals on the die." U.S. Patent No. 5,067,007 (Kanji) addresses a packaging issue different from the claimed

subject matter. As opposed to attachment to the die, Kanji addresses an arrangement in which the lead pins (20) are connected to at one end to a printed wiring board (1) via solder (13) and at the other end to an insulating substrate (4). Kanji is concerned with the thermal and mechanical stresses due to thermal mismatching between the insulating substrate of a microchip carrier and the printed wiring board. (See, e.g., Kanji at col. 4, ll. 21-23; col. 12, ll. 13-23 and 58-67). In sum, it is believed that Kanji is fundamentally different from the claimed invention, which is directed to the attachment of an interconnection element directly to a semiconductor die.

Further, new independent claims 113 and 123 each recite that a tip is located in on the contact end of each interconnection element and points away from the die. Kanji also does not disclose Applicant's claimed tip.

Additionally, Applicant recognizes the Examiner's discussion of the specific lead materials disclosed in Kanji. While it is believed that the claims patentably distinguish over Kanji for at least the reasons set forth above, Applicant believes it also appropriate to address the limitations of new claims 115 – 116. The precursor element as claimed in claims 115 and 116 is a flexible, substantially non-resilient material; the overcoat provides resiliency to the interconnection elements. While the leads in Kanji are discussed as having a plating (11B) applied to the wire (11A), the plating does not serve the same fundamental purpose as the overcoat claimed by Applicant. As opposed to substantially effecting the resiliency of the interconnection element, Kanji explains that:

> "The plating usually comprises of gold (Au) plating or gold (Au)/Nickel(Ni) plating. However, the thickness of the plating is so small that the effect to the bending strength can be neglected. The plating is effected for the purpose of

easy soldering and, concretely, has a thickness of 1 to 4 μm for nickel and 0.1 to 1 μm for gold." (Kanji, at col. 7, l. 64 – col. 8, l. 2).

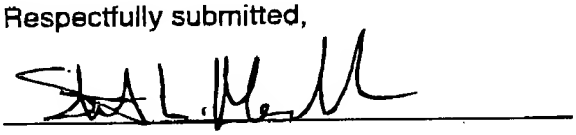
Thus, it is believed that Kanji neither discloses nor suggests the claimed precursor and overcoat materials (e.g., claims 114-116 and 123). Finally, Applicant submits that because of the packaging concern being addressed by Kanji (as discussed above), Kanji, neither alone nor in combination with another reference, is appropriately used to either anticipate or render obvious the attachment of the interconnection element directly on the die as claimed by Applicant.

INFORMATION DISCLOSURE STATEMENT

The Examiner's comment in paragraph 9 of the Final Action that Paper No. 3 has not been considered is noted. Paper No. 3 will be resubmitted under separate cover with the duplicate references removed.

The Assistant Commissioner is hereby authorized to charge any additional fees that may be required by this transmittal and associated documents, or to credit any overpayment to Deposit Account No. 50-0285.

Respectfully submitted,

Date: September 19, 2000 By: 

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